WIndiana & IREC 2011
Solar Workforce Development in Indiana:

Energy Markets & the Benefits of Feed-in Tariffs

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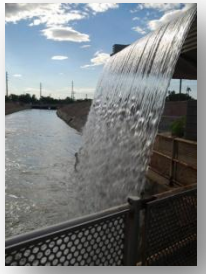
July 21st, 2011

How to Best Incentivize Job Creation & the Growth of Clean Distributed Renewable Energy in Indiana


Basic Outline for Context....

- What is renewable energy
- What is *not* renewable energy
- Centralized v. distributed generation
- Benefits of distributed renewable energy
- Energy markets
- Major energy policies currently in play
- Feed-in Tariffs (a/k/a ARECs, CLEANs)

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Renewable energy can power it!

- Homes
- Offices
- Schools
- Factories
- Farms
- Electric Plug-in Autos

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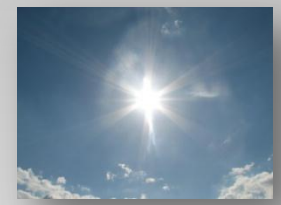
So what counts as renewable energy?

- Solar Technology
- Wind Technology
- Geothermal Technology
- Biomass Technology
- Biogas Technology
- Mini-Hydro Technology



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What is *NOT* renewable energy?

- Coal, gas or oil-fired generation
- Coal-gasification generation
- Coal-bed methane production
- Clean coal technology
- Nuclear energy generation
- Ethanol production

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When renewable energy is used in many locations that is called…..

Distributed Energy Generation (DG)

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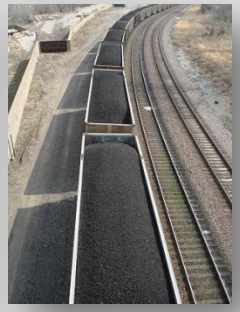
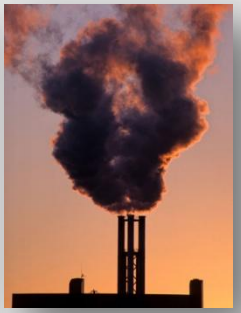
DG differs from most centralized energy generation (CG) in that….

- Fossil fuels are mined & delivered to CG plant
- Fossil fuels are burned/reacted to energy
- A lot of energy is produced at one CG site
- Pollution results at all stages of process
- Energy is delivered via transmission network
- Transmission network must be maintained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Now without disrespect to CG, because it has served us very well, what benefits accrue from using RE as sources of DG?

The 10 Major Benefits of Renewable Energy & Distributed Generation

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Benefit #1

- **Saves money**
  - Saves money otherwise paid to utilities
  - Savings ultimately pay for initial system cost
  - Savings continue thereafter for life of systems
    - Higher net profits in business
    - More funds for more capital re-investment
    - More funds personal use; in all, *more choice*

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Benefit #2

- **Fuel is free**
  - Energy from the earth, wind, water, sun & waste by-products are free
  - System costs are relatively fixed
  - Provides hedge against several risks
    - Rising energy costs due to *increased demand*
    - Rising energy costs due to *monetary inflation*
    - Rising energy costs due to *increase regulation*
      - RES/RPSs, Cap and Trade, etc.

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Benefit #3

- **Reduction in pollution**

Systems emit little or no pollution & reduce associated negative impacts from:

Mining	Transportation
Drilling	Smokestack Emissions
Ecological Destruction	Waste Disposal
Land Reclamation	Transmission Issues
Water Resources	Inefficiency - Line Loss

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Benefit #4

- **Economic growth**
  - Since energy is used where it is created
    - Installations cannot be outsourced
    - Service and maintenance cannot be outsourced
    - Indiana manufacturing sectors could benefit
    - Creates a permanent sustainable job market
    - Creates and keep more jobs in IN & US
    - Keeps US dollars closer to home

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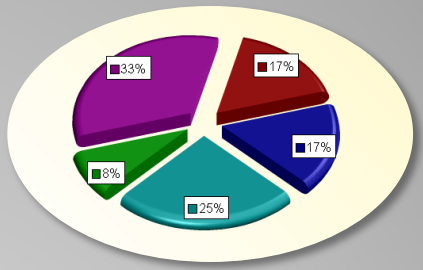
Benefit #5



- **Diversification**
  - From the supply side, diversification provides:
    - Broader use in the variety of:
      - Competing technological resources
      - Fuel resources
      - Types of investment resources
      - Size of investment resources
  - From the demand side, diversification provides:
    - More choices and more opportunities for competition
    - More security:
      - Against outdated & deferred transmission issues
      - From inclement weather
      - From acts of terrorism

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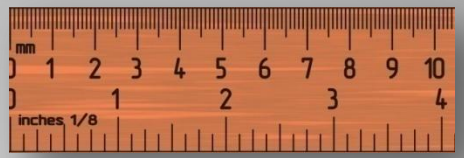
Benefit #6



- **Scalability**
  - Scalability produces greater efficiencies in use of resources and investment capital.
    - Capacity expanded more closely to actual demand
    - Capital investment occurs more efficiently
    - Community resources more closely used as actually need.

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Benefit #7

- **Greater Self-Reliance**

  Anyone:

  - Can produce the most basic need – energy
  - Can save more of his individual resources
  - Can better understand his energy needs
  - Can have more choices to supply his needs
  - Can benefit from more self-awareness

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Benefit #8

- **Less dependence on foreign fuels**
  - RE can supply electricity for electric cars
  - Increased use of electric cars reduces need for oil
  - Reduced dependency reduces geo-political tension
  - Reduced geo-political tension reduces conflicts
  - Reduced conflict reduces burden on communities
  - Reduced burden on communities reduces burden of these inter-connected costs to individuals.

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Benefit #9

- **Educational**
  - Economic sustainability
    - More job creation
    - More monetary savings or conservation of wealth
  - Environmental sustainability
    - Less waste
    - Less pollution
  - Social sustainability
    - More choices
    - More self-reliance and awareness
  - All must co-exist for communities to flourish

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Benefit #10

- **Equity & fairness for more people**
  - More choices provides more competition
  - More competition provides better value
  - Better value conserves personal capital
  - More capital provides more choices
  - More choices provides more individual power

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In Sum… true sustainability

People, Planet, Profit!

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And what is not determinative…

- **Your position on climate change**
  - DG works within the free market
  - Environmental benefits are extensive
  - Social benefits increase self-empowerment

…just smarter living

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Great!

….but why hasn't DG taken off in the market place?

- Change in an efficient market can be slow
- CGs are state regulated monopolies – a barrier to entry
- All energy markets are highly regulated – a barrier to entry
- Subsidies distort pricing & markets[1] – a barrier to entry
  - $72B in subsidies to fossil fuel producers 2002-2008[2]

[1]Koplow, Doug, "Ten Most Distortionary Energy Subsidies" www.earthtrack.net (January 2007) p.1.

[2]Environmental Law Institute, Estimating U.S. Government Subsidies to Energy Sources: 2002-2008 (September 2009) p.5.

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So the true cost of CG energy is very much distorted….

- Then there are the external costs which are hard to quantify but we know they are there:
  - Supply chain protection costs
  - Governmental regulatory costs
  - Research and development costs
  - Latent environmental impairment costs
  - Land reclamation costs
  - Latent health impairment costs
  - Lost opportunity costs

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Thus…

true cost of CG energy is not paid at point the purchase!

… the difference is paid by taxes

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The Trillion Dollar Question is …

How do we transition in a way that is…

- Most equitable to all citizens
- Least disruptive to existing markets
- Most cost-effective in a free market
- Best track record for success
- Best chance for success
- Still maintain the benefits of CG

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Predominant Energy Policies in Play…

- Net metering
- Renewable portfolio standards a/k/a
- Renewable energy standards
- Various federal, state & utility incentives
- Proposed cap and trade model

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Net metering…

- 43 states have net metering[1]
- Rules for application vary widely[1]
- Customer credited for energy production at a 1:1 ratio or less versus billed usage
- Results:
  - Hasn't notably incentivized DG production
  - Hasn't improved distorted market structure
  - Has been a first step toward improvement

[1]http://en.wikipedia.org/wiki/Net_metering#cite_note-7 (January 2010)

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Renewable Portfolio Standards…

- State policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date.
- 24 states have RPSs[1]
- Rules for application vary widely[1]
- Results to date:
  - Has created a small market for utility-scale wind farms
  - Has been a first step toward improvement
  - Hasn't notably incentivized DG production
  - Hasn't notably improved distorted market structure

[1]U.S. Department of Energy, http://en.wikipedia.org/wiki/Net_metering#cite_note-7 (January 2010)

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Various other governmental & utility incentives…

- Federal tax incentives e.g. credits, deductions
- State incentives e.g. property tax exemptions
- Utility based incentives e.g. rebates, etc.
- Results to date:
  - Hasn't notably incentivized DG production
  - Hasn't notably improved distorted market structure
  - Total US electrical generation from renewables (exclusive of ethanol production) = 1%+/-[1]

[1]U.S. Energy Information Administration, http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/rea_prereport.html (July 2009)

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Proposed Cap & Trade Model…

- Federal accounting system for carbon emissions[1]
- Creates emission caps for each polluting source
- Creates an exchange for "trading" unused portion of caps for those sources which don't use total quota to pollute
- Adds another layer of transactional cost to energy markets
- Results to date:
  - Hasn't passed Congress
  - Extraordinarily divisive
  - Stalled progress toward any improvement in the energy markets

[1]Center for American Progress, "Cap and Trade 101", http://www.americanprogress.org/issues/2008/01/capandtrade101.html, (January 16, 2008)

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Have the above policies been very effective?

…US generation from renewables is still at 1%+/-

….market structure still unduly favors large regional monopolies

….tremendous uncertainty exists in the market place

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Has any other form of energy policy shown more effectiveness?

Yes….and it's getting traction in the US

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Feed-in Tariffs

a/k/a ARECs, CLEAN Contracts

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The proof is in the results....

- Globally, 60+ jurisdictions have implemented FIT/ARECs[1]
- Germany is the best example[2](except as re-footnoted)
  - From 1995-2005, total electrical generation from renewables increased from 1% to 12%.
  - From 2005-2007, that percentage increased to 14%.
  - In 2007, renewable energy sales worldwide equaled $15B.
  - In 2007, installed almost half of the world's solar power[3].
  - In 2007, became the world leader in installed wind and solar capacity[4].
  - 1/3 of their wind power is owned by over 200,000 local landowners and residences.
  - 249,000+ jobs have been created in the renewable energy industry.
  - Occurred in country with low renewable resources – see maps below.
  - Recent Deutsche Bank analysis states that FITs are responsible for roughly 75% of global PV development, and 45% of global wind development[1].

[1]Couture, Toby, E3 Analytics (formerly with NREL, Boulder, CO), personal correspondence (December 2009).

[2]Farrell, John, "Feed-in Tariffs in America," New Rules Project (February 2009) p. 11.

[3]http://en.wikipedia.org/wiki/Solar_power_in_Germany

[4]Couture, Toby, E3 Analytics (formerly with NREL, Boulder, CO) & Kathryn Cory, NREL, "State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States" (May, 2009) p. 37.

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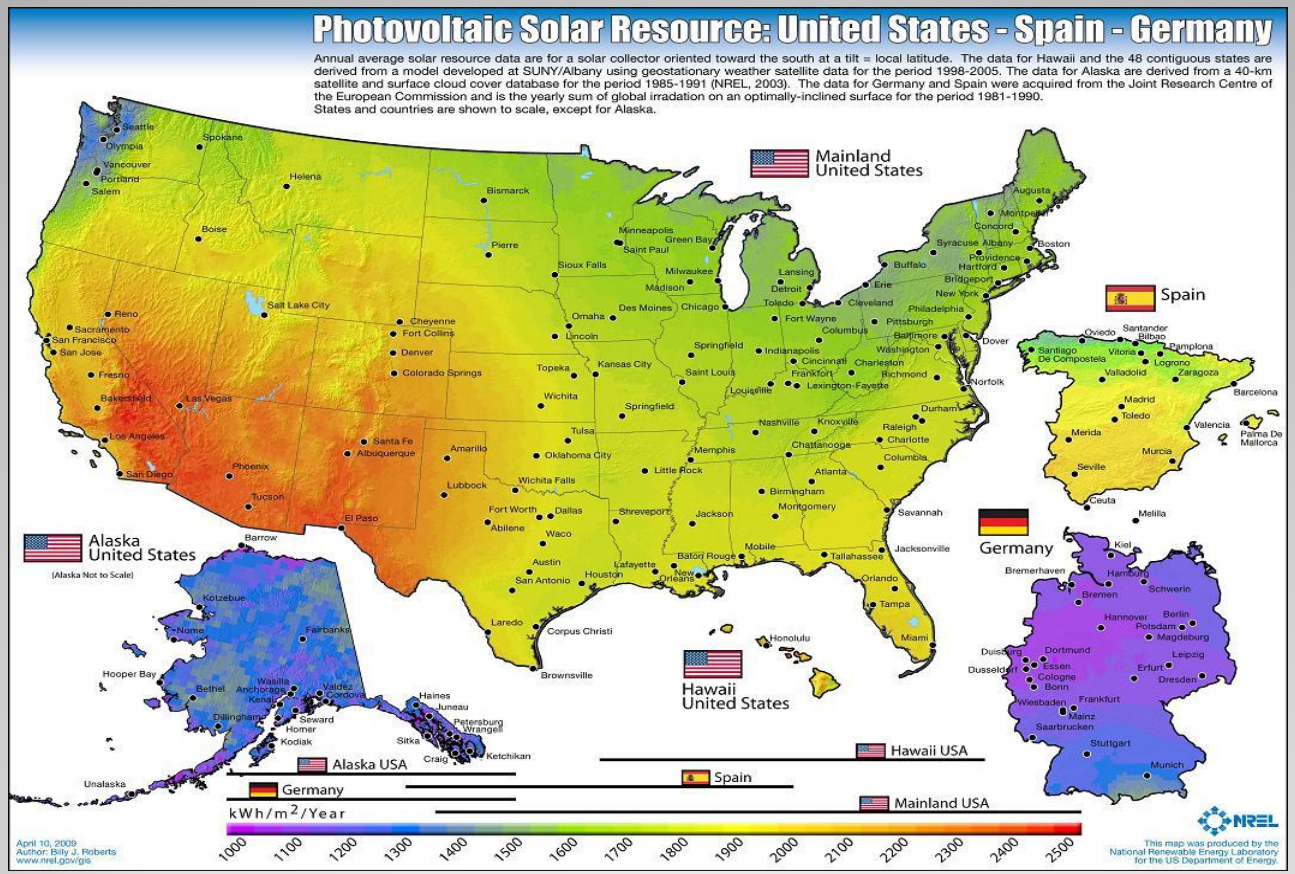
Germany has lower solar resources than Seattle, WA



...and yet amazingly it has accomplished such job growth.

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So what are FiTs?

- **Guaranteed interconnection** to grid for all
  - Individuals, businesses, farms, municipalities
- **Contract** between utility & RE/DG producer
  - Guarantees payments for fixed period – 20 yrs.
- **Payment** is made only after production
  - Energy must be created & delivered to grid first

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Why are FiTs successful?

- Guaranteed access to the grid
  - Simple, transparent, equal treatment, easy to use
- Reasonable compensation for RE investment
  - Contract for payment for RE energy delivered to grid; ROI 8-12%
  - Paid only after energy has been created – protects ratepayers
- Fixed terms reduce lending risk for projects
  - Individuals and companies in market choose to bear risk
  - Banks are more willing to lend under this model
  - Natural and organic economic growth occurs
- ENERGY MARKET BECAME MORE OPEN, FAIRER & COMPETITIVE – THE PLAYING FIELD WAS LEVELED

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Are there risks associated with FiTs?....Not many.

- Setting the structure and rates for the program
  - If set too low, it may not adequately incentivize the market.
  - If set too high, may produce windfall profit for RE producers.
- Increasing overall costs to entire ratepayer base
  - In Germany, average ratepayer cost increased $3.82/month[1].
  - Other studies have indicated reduced incremental cost from less demand for peak generation which saved money overall.

[1]Couture, Toby, E3 Analytics (formerly with NREL, Boulder, CO) & Kathryn Cory, NREL, "State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States" (May, 2009) p. 37.

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In Sum, FITs are very promising.

- Rates & implementation are **equitable**, **simple** to understand, **transparent**.
  - Adaptable to a wide variety of capital resources, settings and degrees of entrepreneurialism.
  - Transactional cost to implement and maintain is very low.
- Contractual structure of the agreements are **bankable**.
  - This allows more persons and entities to engage in energy markets.
  - Shifts investment risk for new capacity away from ratepayer base.
- Energy is **paid for after it delivered**.
  - Simple quid pro quo: not so with large centralized forms of generation.
- FITs have a **track record** unlike any other energy policy to date.
  - Over 60 jurisdictions worldwide are currently using FITs.

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From a broader & longer term perspective....

- FITs are a step toward true individual energy independence where
  - People can create, sell, share their own localized self-produced energy
- Local and global benefits:
  - Significantly lessens local, regional and global environmental harm
  - Creates greater self-awareness and self-reliance
  - Significantly lessens reliance on foreign fuel & geopolitical tensions
  - Significantly reduces the need for migration to more urban areas
  - Significantly reduces the need for increased infrastructure in growing cities
  - Helps others maintain cultural ties & become more globally educated
  - Helps reduce the possibility for deprivation, hunger and war

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Current Status of a FIT/AREC law in Indiana….

- HB #1190 was filed on 1/4/10 by Rep. Matt Pierce - Bloomington
- It died in the House Commerce, Energy, Technology & Utilities Committee
- For the actual text and rates see the following link:
  - http://www.in.gov/legislative/bills/2010/IN/IN1190.1.html

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How can Indiana have a FiT/AREC law?

- Join IDEA – Contact Laura Arnold for an application at
  - laura.arnold@indianadg.org or (317) 635-1701.
- Educate and verify the benefits for yourself
- Educate your friends, colleagues & community
- Educate your local, state & national officials
- Demand adoption of a FIT/AREC law such as HB #1190
  - http://www.in.gov/legislative/bills/2010/IN/IN1190.1.html
- Send this presentation to all of the above
- Follow up for their questions & support
- Give us feedback with your success and other ideas

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To learn more & stay informed…

Check the web out:

- http://www.indianadg.org/home.php (in construction)
- http://www.indianarenew.org/useful_weblinks.html
- http://www.wind-works.org/articles/feed_laws.html
- http://www.nrel.gov/applying_technologies/pdfs/45551.pdf
- http://www.nrel.gov/docs/fy10osti/44849.pdf
- http://www.newrules.org/search/google?cx=011886683168620935570%3Ar5zlky4dr00&cof=FORID%3A11&query=feed-in&form_id=google_cse_searchbox_form#947

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Become a part of IDEA's grass root network.....

- Find your legislators and their contact information at:
  - http://district.iga.in.gov/DistrictLookup
- Email them a copy of this presentation and copy me in if possible at:
  - chris@idsustainability.com
- Follow up with them to request support of a bill like HB #1190 for enactment.

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Any questions or other ideas?

Please contact me at:

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